

d) REMARKS

The Claims are 1-4 with Claim 1 being independent.

The Examiner has objected to the Specification alleging that the title of the invention is not descriptive. The Examiner suggested amending the title to be directed to a method. In accordance with the Examiner's suggestions, Applicants have amended the title.

Claims 1-4 have been rejected under 35 U.S.C. § 103(a), as being unpatentable over Nishimoto (6,100,466) or Hirooka et al. (5,910,342). Specifically, the Examiner alleges Nishimoto "discloses a method of forming a microcrystalline silicon film by high frequency plasma CVD (col. 1, lines 8-15) using an equation which includes power, area, distance, and pressure (col. 3 lines 10-20)." The Examiner further alleges that Nishimoto discloses that "the precursors can be silicon fluoride and hydrogen". The Examiner then alleges that Hirooka et al. provide the teaching that the precursors can be silicon halide and hydrogen and also notes "that the plasma CVD process is affected by a number of parameters including pressure, high-frequency power used, and electrode structure". Thus, the Examiner alleges that Nishimoto lacks only the teaching of the silicon halide precursor, and that Hirooka et al. provides that teaching and further provides a motivation to combine because while Hirooka have no teaching of a specific value of Q, Hirooka et al. refer to parameters that may affect Q.

Applicants respectfully disagree. While it is alleged by the Examiner that Nishimoto "discloses a method of forming a microcrystalline silicon film by high frequency plasma CVD (col. 1, lines 8-15) using an equation which includes power, area, distance, and pressure", Nishimoto discloses a method of forming a microcrystalline silicon film by high frequency plasma CVD, wherein the relation of $400 < Q < 10000$ is satisfied when Q is defines as $Q = P \cdot f^2/d$, where d (cm) is the distance between the substrate and the electrode, P (Torr) is the pressure of the film forming

space during formation of the deposited film, and f (MHz) is the frequency of the high frequency electromagnetic wave. In contrast, Claims 1-4 are directed to a method of forming a silicon based thin film wherein the value of Q defined by $Q = P_o X P_R / S / d$ is 50 or more, wherein P_o (W) is a supplied power, S (cm²) is the area of a high frequency introducing electrode, d (cm) is a distance between the high frequency introducing electrode and a substrate, and P_R (mTorr) is a pressure. Nishimoto provides no teaching whatsoever of a value of Q of 50 or more **as defined by $Q = P_o X P_R / S / d$** . The parameters considered in Nishimoto et al. when considering Q are pressure, frequency and the distance between the electrode and the substrate, not, as the Examiner contends, power, area, distance and pressure. In contrast, the parameters considered for Q in the presently claimed invention are power, pressure, the area of the high frequency introducing electrode, and the distance between the electrode and the substrate.

Applicants therefore assert that the combination of Nishimoto and Hirooka et al. does not provide any teaching for each and every element of Claim 1. Namely, the combination of Nishimoto and Hirooka et al. fails to teach the required element that Q defined by $Q = P_o X P_R / S / d$ is 50 or more. None of the cited references, whether alone or in combination, disclose or suggest a key feature of the present claimed invention

Moreover, while Hirooka et al. may teach that the precursors can be silicon halide and hydrogen, this teaching is not sufficient to correct the deficiencies detailed directly above.

The Examiner has also rejected Claims 1-4 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-6 and 9-15 of U.S. Patent No. 6,100,466 (Nishimoto). The Examiner alleges that "although the conflicting claims are not identical, they are not patentably distinct from each other because the specification of the deposited material is an obvious variation."

For similar reasons indicated above, Applicants respectfully disagree. As noted above, Nishimoto discloses a method of forming a microcrystalline silicon film by high frequency plasma CVD, wherein the relation of $400 < Q < 10000$ is satisfied when Q is defined as $Q = P \cdot f^2/d$, where d (cm) is the distance between the substrate and the electrode, P (Torr) is the pressure of the film forming space during formation of the deposited film, and f (MHz) is the frequency of the high frequency electromagnetic wave, not where, as in the present invention, the value of Q is 50 or more and is defined by $Q = P_o X P_R / S/d$, wherein P_o (W) is a supplied power, S (cm²) is the area of a high frequency introducing electrode, d (cm) is a distance between the high frequency introducing electrode and a substrate, and P_R (mTorr) is a pressure. As noted above, the parameters considered in Nishimoto et al. when considering Q are pressure, frequency and distance. In contrast, the parameters considered for Q in the presently claimed invention are power, pressure, area, and distance. Accordingly, the allegedly conflicting claims are not an obvious variation of one another and are patentably distinct.

The Examiner has also rejected claims 1-4 under the judicially created doctrine of obviousness-type double patenting over claims 1-3 of copending Application No. 09/866665. The Examiner alleges that "the elimination of specific deposition parameters is an obvious variation".

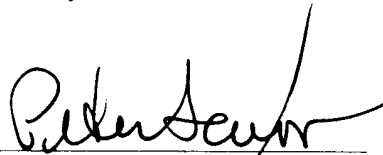
Applicants respectfully disagree. Copending Application No. 09/866665 is directed to the formation of a silicon-type film having a small crystal grain boundary density. The claims recite that the formation requires a specific concentration of oxygen atoms (e.g. 0.1 ppm to 0.5 ppm) based on a concentration of silicon atoms in forming a silicon-based thin film by high frequency plasma CVD. Such a requirement is not found in the pending claims. Key elements of the present claims, namely that the value of Q defined by $Q = P_o X P_R / S/d$ is 50 or more, wherein P_o (W) is a supplied power, S (cm²) is the area of a high frequency introducing electrode, d (cm) is a distance between

the high frequency introducing electrode and a substrate, and P_R (mTorr) is a pressure, are absent from the claims of copending Application No. 09/866665. Therefore, Applicants assert that the invention of the pending claims is not an obvious variation of the claims of copending Application No. 09/866665.

In view of the foregoing comments and amendments, favorable consideration and allowance of all pending claims is earnestly solicited.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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